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ABSTRACT

This study examined gender differences in laterality, socialization, and educational achievement in fourth graders and determined which characteristics predicted mathematical and language achievement. The participants were four fourth grade classes comprised of 32 boys and 45 girls at an elementary school in a small rural town. Measures used were three project-constructed questionnaires--the Student Self-Analysis of Socialization (SSAS), Parent Self-Analysis of Socialization (PSAS), and Teacher Self-Analysis of Socialization (TSAS); a Problem Solving Questions (PSQ) measure; the Laterality Survey; and numerical English and mathematics grades at the end of the school year. Discriminant analysis resulted in a highly significant model, with 87 percent of the children correctly classified. Those variables which best discriminated between boys and girls were their English grades, performance on stereotypic female problem-solving tasks, the gender of the parent who cares for the sick child, and scores on the Student Self-Analysis of Socialization survey. Regression analyses indicated that English grades were best predicted by right-tendency laterality, math grades, and the teacher's opinion on gender and success in math reasoning. Regression analysis also indicated that math grades were best predicted by English grades, left-tendency laterality, and the teacher's opinion on gender success in math reasoning. (Contains 12 references.) (Author/KDFB)

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Gender Differences in Laterality, Socialization, and Educational Attainment in Fourth Grade Students

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Abstract

Gender differences in laterality, socialization, and educational achievement in fourth grade students were examined. Those variables which best discriminated between boys and girls were their English grades, performance on stereotypic female problem-solving tasks, the gender of the parent who cares for the sick child, and scores on the student self-analysis of socialization survey. Regression analyses indicated that English grades were best predicted by right-tendency laterality, math grades, and the teacher's opinion on gender and success in math reasoning. Regression analysis indicated that math grades were best predicted by English grades, left-tendency laterality, and the teacher's opinion on gender success in math reasoning. Thus, both biological and socialization factors contribute to educational attainment of children at a relatively young age.

Gender Differences in Laterality, Socialization, and Educational Attainment in Fourth Grade Students

Previous research has shown differences between the sexes in the areas of biological functioning, academic performance, and socialization processes. The following is a closer examination of the research.

According to Kelly (1994), differences between the sexes begin during fetal development. Differences resulting from fetal hormones have been found in the number and location of nerve synapses and in the hypothalamic region of male and female brains. Some of these differences have been found in laterality. Shaw and Brown (1990) reported that 70% of the population is right handed, 10% of the population is left handed, and 20% is of mixed dominance. Left handed males are twice as common as left handed females. The right hemisphere, which controls the left side of the body, is more spatial, synthetic, and imagistic than the left hemisphere. The right hemisphere is also the hemisphere of the brain that can perform highly complex cognitive processes and visiospatial functions. The left hemisphere is basically more analytical, sequential, and linguistic than the right.

Differences in academic performance have been noted in several studies. Jerry E. Bishop (1995) reported that females drastically trail males in tests of math ability. Males received 5% of the highest scores on mathematical tests, while performing seven times better than females on tests of science. However, males were outperformed by females on reading comprehension and vocabulary. Research by Kelly (1994), also supported Bishop's findings. Males outperformed

females in the areas of mathematical reasoning and comprehension of spatial reasoning. A possible explanation of these findings comes from Jackson, Fleury, Girvin, and Gerard (1995) who found that males seem to perform better on standardized math ability tests because of their interests in sports, computer games, etc., which largely involve the use of numbers and statistics, whereas females were more interested in activities of a more subjective nature such as physical beauty. This would explain the fact that females had a higher performance in the areas of arithmetic calculations, verbal fluency, and reading speed/comprehension; however, the sexes performed equally well on tests of vocabulary and verbal reasoning. From this research, the question can be raised as to whether these differences are innate or the result of socialization.

There are many agents of socialization. The family serves as one of the primary agents. Crouter, Manke, and McHale (1995) found that in early adolescence, there is a widening gap between the gender's perception of sex-role attitudes. The researchers found that gender intensification was greater when household work was divided along traditional male/female lines. They suggested the modeling process as an explanation of sex-typed chores/activities . This view is also supported by Kochenberger-Stroeher (1994). In testing primary students, she found that students who had the privilege of exposure to the arts and culture as well as career modeling from parents still continued to demonstrate traditional gender role beliefs. She found that females, while realizing that nontraditional careers were available to women, nevertheless elected traditional career choices. From this, one could infer that the home situation of these children had little to no effect on their traditional or nontraditional sex-role choices.

The results of socialization can also be seen in the area of academics. Thomas (1995) found when lessons catered to stereotypic male preferences such as games, songs, role plays, etc.,

they were eager learners. However, when the lessons placed emphasis on written accuracy, which favors the stereotypic preferences of females, the males seemed to lose interest in learning. On the other hand, Gose (1995) cited the concept of stereotype vulnerability, which means that females interpret their academic anxiety as conformation that females are inferior to males in the classroom. In addition, Dickens and Cornell (1990), as quoted in Terwilliger and Titus (1995) found that

> parents' expectation of their gifted adolescent girls had a significant impact on the girls' beliefs about their own mathematics abilities. These results are in line with earlier research which found that parents' beliefs and expectations about their daughters' abilities impact the girls' beliefs about their ability more than the girls' own past performances (30).

Parental expectation is not the only influence on children's abilities. According to Xue Lan Rong (1996), teacher's expectations also play an integral part in influencing abilities. Xue Lan Rong (1996) reported that there was a close relation between teacher expectations of social behavior and the students' sense of social competence. Louise M. Luckenbill (1995) found that intelligent males were favored by teachers as well as parents in arithmetic classes and received more encouragement than intelligent girls. The operational definition for teacher perception adhered to in this study was taken from Xue Lan Rong (1996). It was defined as "the measure of the teacher's beliefs concerning a student's likely academic performance, social behaviors, or ability level" (262).

What factors differentiate between males and females? Based on previous research, it was hypothesized that:

1. Socialization and laterality factors will discriminate between males and females.
2. Laterality and socialization factors will be significant predictors of math and English grades.

For this study, definitions were taken from Kelly (1994). Traditional male traits for children were defined as: independence, aggression, competitiveness, leadership, task orientation, assertiveness, innovation, activity, objectivity, analytic mindedness, courage, unsentimentality, rationality, confidence, and emotional control. Traditional female traits for children were defined as: reliance, trust, cooperativeness, supportiveness, inner orientation, inner person orientation, empathy, sensitivity, nurturance, subjectivity, intuitiveness, creativeness, yieldingness, fragility, cautiousness, emotional fluidity (112).

This study was designed to determine differences between males and females in the areas of laterality, socialization, and problem solving abilities as well as to determine what characteristics will predict mathematical and language achievement.

Method

Participants

The participants were four fourth grade classes (ages 9-10 years) consisting of 32 boys and 45 girls at an elementary school located in a rural small town. Their parents and teachers also completed questionnaires.

Materials

Materials used were as follows:

1. Student Self-Analysis of Socialization (SSAS) - This measure was constructed for this study to determine if the students were socialized to hold stereotypical attitudes toward gender roles. A sample question from this measure is: What do you want to be when you grow up? Score range = 32 - 74.
2. Parent Self-Analysis of Socialization (PSAS) - This measure was constructed for this study to determine if the students' parents held stereotypical attitudes toward gender roles. A sample question from this measure is: Which parent takes care of the child when he or she is sick? Score range = 1 - 10.
3. Teacher Self-Analysis of Socialization (TSAS) - This measure was constructed for this study to determine if the students' teacher held stereotypical attitudes toward gender roles. A sample question from this measure is: Do males or females perform better on math reasoning problems? Score range = 4 - 16.

4. Problem Solving Questions (PSQ) - This measure was constructed based upon the assumption that males and females have different strengths in the area of academics. A sample male problem is: In your pocket you have five quarters and seven dimes. You spend two dimes and five quarters. How much money do you have left? A sample female problem is: Write as many words beginning with the letter "L" as you can in three minutes. Score range for male problems = 0 - 2. Score range for female problems = 0 - no maximum.
5. Laterality Survey (Newton and Thompson, 1976) - Score range = +10 (completely left sided) - +20 (completely right sided). Scores were assessed by ten common tasks. Materials needed to complete the laterality survey were as follows: pencil, scissors, ball, jar with lid, key, paper towel roll, index card with hole, kick ball, and a deck of cards.
6. English grades were the number grades given to the children at the end of the last nine weeks of the school year.
7. Math grades were the number grades given to the children at the end of the last nine weeks of the school year.

High scores on all tests indicated tendency toward female characteristics.

Procedure

Students were taken from the classroom in groups of ten. Each child was tested first on the Laterality survey. Then he/she went to a table where the PSQ was administered. Finally, the SSAS was administered. Math and verbal data were obtained from existing records.

The TSAS was completed by each teacher whose class was involved in the study. The measures were given to the teachers to send home with the children a week before the children participated, and were collected on that day.

Results

Discriminant analysis, performed on the data to show differences between male and female groups, resulted in a highly significant model (see Table 1). Eighty seven percent of the children were correctly classified, with three boys and seven girls not fitting into the gender models. Those factors which significantly discriminated between boys and girls were the SSAS, PSQ, and the PSAS.

Insert Table 1 here

Stepwise regression analysis was performed first with the English grades as the dependent variable to determine the predicting factors of the English grade. As can be seen in Table 2, math grades, left tendency laterality, and the teacher's opinion that males perform better in math reasoning were the significant factors. Stepwise regression analysis was also performed with the

math grade as the dependent variable to determine the predicting factors of the math grade. Those significant factors were right-tendency laterality, English grades, and the teacher's opinion that males perform better in math reasoning.

Insert Table 2 here

Discussion

In our sample of children, most girls identified with female traits, while most boys identified with male traits. In addition, there was a positive relationship between the female gender and success on solving the female oriented problem. The types of problems solved by the children also held true to gender stereotypes. This finding supports the results of Bishop (1995) and others showing that children's problem solving differs along gender lines. Moreover, boys and girls were not significantly different in math and English grades. Since math and English grades are both predictors for one another, success in one area at this age predicts success in the other. It seems that some children, regardless of gender, are more able and better prepared in both areas.

Biological factors, as measured by laterality, are also significant in the attainment of math and English grades. This evidence, that left-sidedness predicted high math achievement and right-sidedness predicted verbal performance, replicated the work of Shaw and Brown (1990) and many other authors. In the present study, it is shown that these laterality differences and their academically related skills are present at the fairly young age of 9 to 10 years.

The data from this study support much previous evidence that socialization factors from parents and teachers also influence math and English achievement. Teacher expectations, in the form of whether the teacher believes that males or females are better at math reasoning problems, significantly contribute to a student's educational attainment. Xue Lan Rong (1996) summarized these determinants, "...teachers beliefs, attitudes, behaviors, and perceptions influence the level and type of communication and classroom interaction, the quality and rigor of instruction, and the affection that they showed toward their students" (280-81). Our study suggests that early in their school careers, the influences that bear on children's mathematical and verbal attainment are varied, integrating elements from their biological endowment as well as gender socializing pressure from parents and teachers.

References

Bishop, Jerry E. (1995, July 7). Boys Outnumber Girls Among Leaders on Mental Tests. The Wall Street Journal, pp. B3.

Crouter, Ann C., Manke, Beth A., and McHale, Susan M. (1995). The Family context of Gender Intensification in Early Adolescence. Child Development, 66, 317-329.

Gose, Ben (1995). Test Scores and Stereotypes. Chronicle of Higher Education, 41, A31.

Jackson, Linda A., Fleury, Ruth E., Girvin, Jennifer L., and Gerard, Donna A. (1995). The Numbers Game: Gender and Attention to Numerical Information. Sex Roles, 33, 559-568.

Kelly, Gary F. (1994). Development and Social Perspectives on Gender. In Sexuality Today (95-126). Connecticut: Dushkin.

Kochenberger-Stroeher, Susan (1994). Sixteen Kindergartners' Gender-related Views of Careers. The Elementary School Journal, 95, 95-103.

Luckenbill, Louise M. (1995). Biological Superiority in Math: Calvin or Susie? Montessori LIFE, 7, 28-32.

Newton, M., and Thompson, M. (1976). Aston index. Wisbech, England: Learning Development Aids.

Rong, Xue Lan (1996). Effects of Race and Gender on Teachers' Perceptions of the Social Behavior of Elementary Students. Urban Education, 31, 261-290.

Shaw, Geraldine A., and Brown, Geoffrey (1990). Laterality and Creativity Concomitants of Attention Problems. Developmental Neuropsychology 6, 39-57.

Terwilliger, James S., and Titus, Janet C. (Winter 1995). Gender Differences in Attitudes and Attitude Changes Among Mathematically Talented Youth. Gifted Child Quarterly, 39 29-35.

Thomas, Alison. (1995). Why Are Boys Such Reluctant Linguists? Times Educational Supplement, 4107, SS2.

Table 1

Discriminant Analysis Outcomes

Canonical Discriminant Functions

Function	Eigenvalue	Wilks' Lambda	Chi-Square	Degrees Of Freedom	Significance
1	1.58	.39	64.08	15.00	.00

Variable	Significance	Wilks' Lambda	Mean (S.D.)	
			M	F
Student Self-Analysis of Socialization	.00	.53	44.00 (5.61)	54.38 (5.46)
Gender Oriented Problem Solving	.01	.92	11.19 (3.83)	13.4 (3.69)
Gender of Parent who Cares for Sick Child	.04	.95	.38 (.66)	.78 (.95)
English Grade	.07	.96	86.45 (10.89)	90.00 (5.92)
Math Grade	.11	.97	86.22 (10.66)	89.51 (7.08)
Laterality Survey	.15	.97	17.72 (2.65)	18.47 (1.87)

Table 2

Stepwise Regression Analyses for English Grades and for Math Grades

Variable	Beta	Sig
PREDICTORS FOR ENGLISH		
Laterality (right side)	.16	.03
Math Grade	.84	.00
Teacher's Opinion Of Male/Female--Math Reasoning	-.32	.00
PREDICTORS FOR MATH		
English Grade	.77	.00
Laterality (left side)	-.17	.01
Teacher's Opinion Of Male/Female--Math Reasoning	.34	.00